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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/785,005	02/25/2004	Shigeru Fujita	SON-2612/DIV	9742

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EXAMINER	
LE, THAO X	

ART UNIT	PAPER NUMBER
2814	

DATE MAILED: 03/01/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/785,005	FUJITA, SHIGERU	
	Examiner	Art Unit	
	Thao X. Le	2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 February 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5 and 13-16* is/are pending in the application.

4a) Of the above claim(s) ____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5 and 13-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claim1-5, and 13-16 rejected under 35 U.S.C. 103(a) as being unpatentable over US Pub 2002/0190302 to Bojarczuk, Jr. in view of US 6900122 to Ahn et al. and/or US 6563182 to Horikawa.

Regarding claim 1, Bojarczuk discloses a semiconductor device fig. 1 and 4 comprising: a semiconductor substrate 210 [0031], a high dielectric-constant film 220 [0016] on the semiconductor substrate 210, and a nitride layer 430 [0036] & [0038] on the high-dielectric-constant film 220, fig. 4, wherein the high dielectric constant film 220 is selected from film comprised of enhanced dielectric material including HfO_2 and silicate [[0016] derided from said enhanced dielectric material, and film having multiple-layered structure including at least two layers (220/220), fig. 4, of said silicate film [0016].

But, Bojarczuk does not disclose the high-dielectric constant film 220 including PrO_2.

However, Ahn discloses a semiconductor device in fig. 4c comprises a high-dielectric constant film including praseodymium gate oxide, see abstract. And Horikawa discloses a semiconductor device in fig. 1 wherein the gate dielectric comprises a high-dielectric constant film including praseodymium oxide or hafnium oxide, col. 3 line 63. At the time of the invention was made; it would have been obvious to one of ordinary skill in the art to use the praseodymium oxide teaching of Horikawa to replace the layer 220 of Bojarczuk, because such material substitution would have been considered a mere substitution of art-recognized equivalent values, MPEP 2144.06. Or the praseodymium oxide layer would have very low leakage current as taught by Ahn, col. 5 lines 10-15.

Regarding claims 2-4, 14-15, Bojarczuk discloses the semiconductor device further comprises a p-type impurity-contained layer 240 [0009] on the nitride layer 430, fig. 4, wherein the nitride layer 430 is formed by introducing nitrogen in to the top surface portion of the high-dielectric-constant film 220 [0018], wherein the semiconductor substrate 210 is a silicon substrate [0031].

Regarding claims 5 and 16, Bojarczuk discloses the semiconductor device wherein the p-type impurity-contained layer 240 [0009].

But Bojarczuk does not expressly disclose the boron-contained silicon layer. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to use boron to created p-type silicon, because such boron

doping to create a p-type layer is conventional in the art, see Ramkumar in column 1 line 27-30.

Regarding claim 13, Bojarczuk discloses a semiconductor device in fig. 1 and 4 comprising: a semiconductor substrate 210, a gate insulating film 220 on a semiconductor substrate 210, and a gate electrode 240 formed on the gate insulating film 220 and including at least a p-type impurity layer [0009] and [0042], wherein the gate insulating film includes a high-dielectric-constant film 220 and a nitride layer 430, fig. 4, on the high-dielectric-constant film 220, wherein the high dielectric constant film 220 is selected from film comprised of enhanced dielectric material of films including HfO_2, silicate [0016] film derived from said enhanced dielectric material, and film having multiple-layer structure of at least two layers of said silicate film [0016].

But, Bojarczuk does not disclose the high-dielectric constant film 220 including PrO_2.

However, Ahn discloses a semiconductor device in fig. 4c comprises a high-dielectric constant film including praseodymium gate oxide, see abstract. And Horikawa discloses a semiconductor device in fig. 1 wherein the gate dielectric comprises a high-dielectric constant film including praseodymium oxide or hafnium oxide, col. 3 line 63. At the time of the invention was made; it would have been obvious to one of ordinary skill in the art to use the praseodymium oxide teaching of Horikawa to replace the layer 220 of Bojarczuk, because such material substitution would have been considered a mere substitution of art-

recognized equivalent values, MPEP 2144.06. Or the praseodymium oxide layer would have very low leakage current as taught by Ahn, col. 5 lines 10-15.

Conclusion

4. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Thao X. Le whose telephone number is (571) 272-1708. The examiner can normally be reached on M-F from 8:00 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M. Fahmy can be reached on (571) 272 -1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Thao X. Le
22 Feb. 2006